(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 737 462 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
16.10.1996 Bulletin 1996/42

(51) Int. Cl.[6]: **A61F 13/15**

(21) Application number: **95830145.9**

(22) Date of filing: **11.04.1995**

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IE IT LI NL PT SE

(71) Applicant: **PANTEX S.r.l.**
I-51031 Agliana, Pistoia (IT)

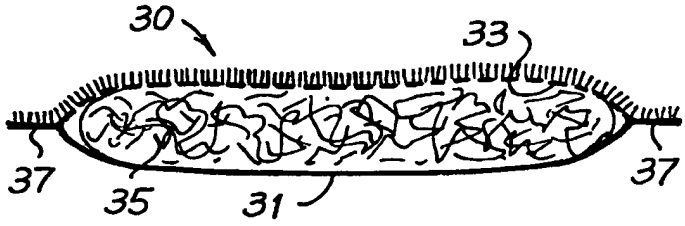
(72) Inventor: **Giacometti, Claudio**
I-51030 Pieve a Celle, Pistoia (IT)

(74) Representative: **Mannucci, Gianfranco, Dott.-Ing.**
Ufficio Tecnico Ing. A. Mannucci
Via della Scala 4
50123 Firenze (IT)

(54) Laminated material for the production of sanitary napkins and the like and absorbent products made with the said material

(57) A laminated material is described to cover the outside of an absorbent product, characterized in that at least one portion of the surface of the said laminated material (F) bears a layer of fibres (13) applied by flocking. This gives the absorbent product excellent tactile properties and eliminates the typical disadvantages of products that use plastic films that come into direct contact with the skin.

Fig. 5



EP 0 737 462 A1

Description

Technical field

The present invention relates to a laminated material, preferably a plastic film, particularly suitable for the manufacture of absorbent products, such as sanitary napkins in particular but also absorbent products of other types, such as baby diapers and incontinence pads.

The present invention also relates to an absorbent product made using the said laminated material.

Sanitary napkins, baby diapers, incontinence pads and the like are currently produced using an impermeable backsheet, an intermediate absorbent mass and a topsheet that is permeable to fluids (at least in the central zone). The backsheet and topsheet are joined along the edge of the product by any suitable method, such as welding, gluing, etc.

The structure of the topsheet must permit fluid to pass rapidly from the outer to the inner surface, i.e. into the absorbent mass. It must also prevent the fluid passing back to the outside, even when the absorbent mass is compressed, for example by the body weight of the user, and must enable a certain distance to be maintained between the skin of the user (which is in contact with the outer surface of the topsheet) and the absorbent mass inside. Finally, because the topsheet comes into contact with the skin, it is advisable that it should be pleasing to the touch and have a textile handle.

State of the art

The topsheet is made of a nonwoven fabric or, according to a more recent technique, a perforated plastic film.

The perforated plastic film has the disadvantage of being very thin and especially of being unpleasant to the touch, unlike nonwoven fabric.

To give the plastic film a "textile" exterior appearance and handle and thereby eliminate, or at least reduce, the unpleasing appearance and handle resulting from its shininess and smoothness, numerous processes of varying complexity have been developed for treating the surface of the film that are intended not only to create suitable perforations in the film to render it permeable to fluids, but also to improve its aesthetic, visual and tactile properties. In addition, these processes tend to perforate the film by deforming it, so that its overall thickness is greater than that of the unperforated film. To this end the film is subjected to cold or hot plastic deformation during the perforation operation so that in the zones surrounding the holes flaps of plastic material are created that stand up from the surface of the film. This is known as three-dimensional film, i.e. it has a depth perpendicular to the surface of the film that is much greater than the depth of the unprocessed film.

The various processes proposed for the surface treatment and perforation of the plastic film include, for example, those described in USA patents Nos. 3,484,835, 3,911,187, 3,950,480, 3,957,414 and 4,151,240. Among the most recent solutions, USA patent No. 4,342,314 describes a device and a process for the perforation of a plastic film intended for use in the production of sanitary napkins and baby diapers in which a vacuum roll, with one wall defined by a complex multilayered structure, is used to emboss a plastic film under vacuum. The structure of the roll is designed so that the plastic film assumes an almost fibrous surface structure and so acquires tactile properties very similar to those of fabric. Improvements to this process are described in WO 93/12749. Similarly with the aim of obtaining an air-permeable plastic film with surface properties similar to those of a fabric, USA patent No. 4,463,045 describes a method of perforating the plastic film and at the same time applying a design to the surface of the film, thereby reducing the shininess typical of plastic material.

All the methods of perforation and surface treatment described in the earlier patents cited above are highly complex and difficult to carry out and require expensive machinery. In addition, the results obtained in terms of the tactile properties of the product are unsatisfactory.

EP-A-0,598,970 describes an extremely simple and effective new method of perforating a laminated material and in particular a plastic film, for the purposes described above, using two rolls, one with projections and one that is smooth. The film acquires depth, permeability and surface treatment by virtue of a simple difference in the peripheral speed of the two rolls.

Objects of the invention

The object of the present invention is to propose a new type of laminated material for use in the production of sanitary napkins, baby diapers, incontinence pads and the like that has even better qualities than the traditional products.

More particularly, the present invention proposes a method of producing a laminated material, and in particular a plastic film, whose visual and tactile surface properties are even closer to those of a piece of fabric, whilst retaining all the typical advantages of the plastic film, especially the advantages in terms of providing a protective layer between the user's body and the absorbent mass inside the product, rapid passage of fluid from the outside to the inside of the absorbent product, and preventing fluid passing back from the inside to the outside of the product.

Further objects and advantages of the present invention will become apparent to experts in the field on reading the text below.

Brief description of the invention

In essence the invention relates to the production of a laminated material to cover the outside of an absorb-

ent product, in which at least one portion of the surface of the said laminated material bears a layer of fibres applied by flocking, i.e. anchored to the surface of the laminated material by a layer of resin or other adhesive and aligned substantially at right angles to the surface of the said material.

The laminated material can in principle also be a nonwoven fabric but is preferably a plastic film of the type usually used to cover sanitary napkins, diapers and similar products. In this way, all the advantages of the plastic film are retained while its disadvantages are eliminated, in particular its unpleasant tactile properties when the product is in contact with the skin.

The technique of flocking is known per se in the textile industry for the production of mock velvet. In these applications, the fibres are applied to a laminated support made of fabric or even nonwoven fabric that is fairly thick.

In principle, the flocked laminated material can be used to cover either the back or the top of an absorbent or similar product. If used as a backsheet it will not be perforated. However, the major advantages are achieved by using the flock-covered plastic film as the topsheet in an absorbent product. In this case the plastic film will be fully or partially perforated to make it permeable to fluids.

The plastic film can be perforated by any known method, for example any of the methods described in the patents cited above, and will preferably be perforated before undergoing the flocking process. It can also be embossed before being perforated.

The invention also relates, in particular, to an absorbent product of the type comprising an impermeable backsheet, a topsheet that is permeable to fluids and an absorbent mass enclosed between the said topsheet and the said backsheet. According to the present invention, at least the topsheet of the absorbent product is made of a laminated material, to at least one portion of the external surface of which fibres are applied by flocking, i.e. are attached to the external surface by a layer of polymerized resin or other adhesive and aligned at right angles to the surface of the laminated material.

Depending on the structure of the laminated material, fibres with hydrophobic or hydrophilic properties can be used. If, for example, the laminated material has a perforated zone free of flocked fibres and an unperforated zone covered with fibres, the latter will advantageously be hydrophobic so as to repel the fluid and direct it towards the zone which is free of fibres, where the perforations will permit its rapid downflow into the absorbent mass underneath. If the surface of the laminated material is either completely or partially perforated and is completely covered with fibres applied by flocking, then these fibres should be hydrophilic so as not to impede the downflow of the fluid from the top surface of the product into the absorbent mass inside it. The resin used to anchor the fibres to the laminated material can also be selected to suit the type of application. A closed-cell resin is preferable for the application of hydrophobic fibres to zones where rapid "horizontal" removal of the fluid is required, i.e. removal along the surface towards perforated zones that permit the downward flow of the fluid in a "vertical" direction, i.e. through the laminated material into the interior of the absorbent product. An open-cell resin is preferable in the case where the fibres are applied to the zone where the laminated material is perforated and is designed to allow the downflow of the fluid from the outer surface to the interior of the absorbent product.

The length of the fibres can be selected, for example, from a range of 0.3 to 2 mm and preferably of 0.5 to 1.5 mm. The count can vary between 0.3 and 5 denier and preferably between 0.5 and 3 denier. Examples of suitable fibres are those of the cellulose, polyamide, polypropylene, polyester or equivalent type.

Brief description of the drawings

The invention will be better understood from the description and attached drawing, which shows a practical nonlimiting embodiment of the said invention. In the drawing:

Fig. 1 shows a diagram of a flocking plant;
Fig. 1A shows an enlarged front view of a possible form of doctor blade suitable for use in the plant in Fig. 1;
Fig. 2 shows a piece of plastic film with flocked strips;
Fig. 3 shows a sanitary napkin made with the film shown in Fig. 2;
Figs 4A and 4B show two cross-sections of two different embodiments of the sanitary napkin shown in Fig. 3;
Fig. 5 shows a cross-section, similar to those in Figs 4A and 4B, of a third embodiment of a sanitary napkin;
Figs 6 and 7 show diagrammatic enlargements of two cross-sections of two films according to the invention.

Detailed description of the invention

Fig. 1 shows a highly diagrammatic representation of a plant for the production of a flocked film according to the invention. Plants of this type are known per se and are widely used in the manufacture of mock velvets. A plant of this type can be adapted for the production of the film according to the present invention. The structure of the plant is described briefly, without giving details of its construction, which will be known to experts in the field.

B1 is a reel of plastic film F to be processed, which is unwound in the direction of the arrow f and is fed into a flocking machine 1. Upstream of the flocking machine 1 is a spreading station 3, in which a nozzle 5 or other appropriate device applies a polymerizable resin R to the upper surface of the film F. Downstream of the noz-

zle 5 is a doctor blade 7 which distributes the resin over the film F. The doctor blade can have a smooth edge positioned a preset distance from the surface of the film and parallel to it to ensure that a uniform layer of constant thickness is spread on the film. Conversely, a doctor blade with a toothed profile can be used as shown diagrammatically in Fig. 1A, which shows a front view of a portion of the doctor blade. By positioning the doctor blade so that the teeth 7B touch the surface of the film F, strips of resin will be applied to the latter that are of uniform thickness (roughly equal to the depth of the teeth 7B) and have a width, in the tranverse direction to the direction of movement of the film, equal to the length of the indented portions 7A of the doctor blade between one tooth and the next. The doctor blade 7 works in conjunction with a counter roller 9 or with another appropriate counter device, for example a conveyor belt or similar element on which the film F rests.

The flocking machine illustrated in Fig. 1 is a dual-station version but the use of a single-station version or a version with more than two stations is not excluded. Each station 1A, 1B has a metering device 11 which distributes an adjustable quantity of fibres 13 onto the film F below. The area in which the fibres 13 fall is enclosed in an electrostatic field whose force lines are vertical and perpendicular to the film F. The electrostatic field is created by two electrodes 15 and 17 situated above and below the film F. This means that the orientation of the fibres when they become anchored to the layer of resin spread on the upper surface of the film is the same as that of the force lines of the electrostatic field. A vibrator 19 situated below the film keeps the latter in a state of high frequency vibration to ensure correct distribution of the fibres and removal of the fibres that are not correctly anchored in the resin. The latter are collected by a suction device 21.

Downstream of the flocking machine, the film passes through a drying chamber 23 where the resin is polymerized. On emerging from the chamber the film is then rewound onto a reel B2.

The film F on the reel B1 can be a previously perforated film, or the spreading station 3, the flocking machine 1 and the chamber 23 can be installed downstream of a section of processing line in which an unperforated film is continuously perforated. In the latter case, the processing takes place in a single line, starting with an intact and basically two-dimensional film and ending with a perforated film with a three-dimensional, flocked structure.

The possibility of the film being perforated after the flocking has been carried out is not excluded. However, this can be problematic since the heat or pressure applied to the film to create the perforations can damage the flocked fibres.

The film can be perforated over its entire surface or only in certain zones, as described in EP-A-0,598,970. If the flocked film is to be used as the backsheet of an absorbent product it should not be perforated.

Fig. 2 shows a portion of film F obtained using a doctor blade 8 of the type shown in Fig. 1A. The film has strips 25 to which are anchored the fibres 13 and strips 27 bearing no fibres. Over the area of at least the strips 27 the film is perforated. A film of this type can be used in the production of sanitary napkins as illustrated in Figs 3, 4A, 4B and 5. 31 indicates the backsheet of the sanitary napkin 30 and 33 the topsheet. Between the two layers is the absorbent mass 35. The two layers 31 and 33 are joined along the edge 37 of the sanitary napkin. As is clearly visible in Fig. 3, the topsheet 33 of the sanitary napkin is made with a film F of the type with flocked strips, as illustrated in Fig. 2. The perforated and unflocked strip 27 of the film F forms the central zone of the sanitary napkin 30 with the flocked, preferably unperforated, strips 25 on either side of this.

In this way the plastic surface of the film F comes into contact with the body only in the central zone, while the lateral zones have a layer of flocked fibres and the skin is therefore in contact with the fibres. If the flocked fibre is treated to make it hydrophobic, this will cause the fluid to flow along the surface of the film towards the central zone, where it will pass through the holes in the film and rapidly be absorbed by the absorbent mass inside the product. As is clearly visible in Figs 4A and 4B, the film forming the topsheet 33 can be perforated either in the central zone alone (Fig. 4A) or over the entire surface (Fig. 4B). The second solution may be preferable if the said perforated film is to be used as a semiprocessed product for various applications, for example for sanitary napkins and baby diapers.

The backsheet 31 of the sanitary napkin 30 does not come into contact with the skin and can therefore be made of ordinary plastic film (Figs 4B and 5). The use of a flocked film for the backsheet 31 as well (Fig. 4A) gives both surfaces of the sanitary napkin a textile handle.

Figs 6 and 7 show two enlarged, diagrammatic cross-sections of a flocked film F. Fig. 6 shows a piece of film with perforated strips and flocked strips. It has an unperforated portion to which the flocked fibre is applied and a perforated portion with no fibres. Fig. 7, by contrast, shows a partially perforated and partially unperforated film with fibres applied over the entire surface. In this case a roughly uniform layer of flocked fibre is formed over the entire surface of the film.

The drawings are intended to show only one embodiment given by way of a practical demonstration of the invention, since the said invention can vary in shape and disposition without thereby departing from the scope of the underlying concept of the said invention, as defined in the attached claims. Any reference numbers given in the attached claims are intended to facilitate the reading of the claims with reference to the description and the drawings and do not limit the scope of the protection afforded by them.

Claims

1. Laminated material to cover the outside of an absorbent product, characterized in that at least one portion of the surface of the said laminated material (F) bears a layer of fibres (13) applied by flocking.

2. Laminated material according to Claim 1, characterized in that it is a plastic film.

3. Laminated material according to Claim 1 or 2, characterized in that it has at least one perforated portion.

4. Laminated material according to Claim 3, characterized in that one portion of the surface (27) bears no flocked fibres (13) and adjacent portions of the surface (25) have a layer of flocked fibres (13), with at least the said portion that bears no flocked fibres being perforated.

5. Laminated material according to Claim 3, characterized in that the material is deformed in the perforated zone and has an overall thickness greater than that of the unperforated laminated material.

6. Absorbent product comprising an impermeable backsheet (31), a topsheet (33) that is permeable to fluids and an absorbent mass (35) enclosed between the said topsheet and the said backsheet, characterized in that at least the topsheet is made of a laminated material, to at least one portion of the external surface of which flocked fibres (13) are applied.

7. Absorbent product according to Claim 6, characterized in that the said topsheet (33) is a plastic film that is at least partially perforated, the overall thickness of the perforated zone being greater than that of the unperforated film.

8. Absorbent product according to Claim 7, characterized in that the said topsheet (33) has a central strip (27) free of flocked fibres, and two lateral strips (25) to which a layer of flocked fibres is applied.

9. Absorbent product according to Claim 8, characterized in that the said fibres (13) are hydrophobic fibres.

10. Absorbent product according to Claim 9, characterized in that the said plastic film is entirely perforated and in that at least one portion of its surface bears a layer of flocked fibres (13).

11. Absorbent product according to one or more of Claims 6 to 10, characterized in that the backsheet (31) has a covering of flocked fibres (13) on its external surface.

12. Absorbent product according to one or more of Claims 6 to 11, characterized in that the said fibres (13) are between approximately 0.3 and 2 mm long and have a count of between approximately 0.3 and 5 denier.

13. Absorbent product according to one or more of Claims 6 to 12, characterized in that the said fibres are selected from the group comprising polyamide fibres, polypropylene fibres, cellulose fibres and polyesters.

Fig.1

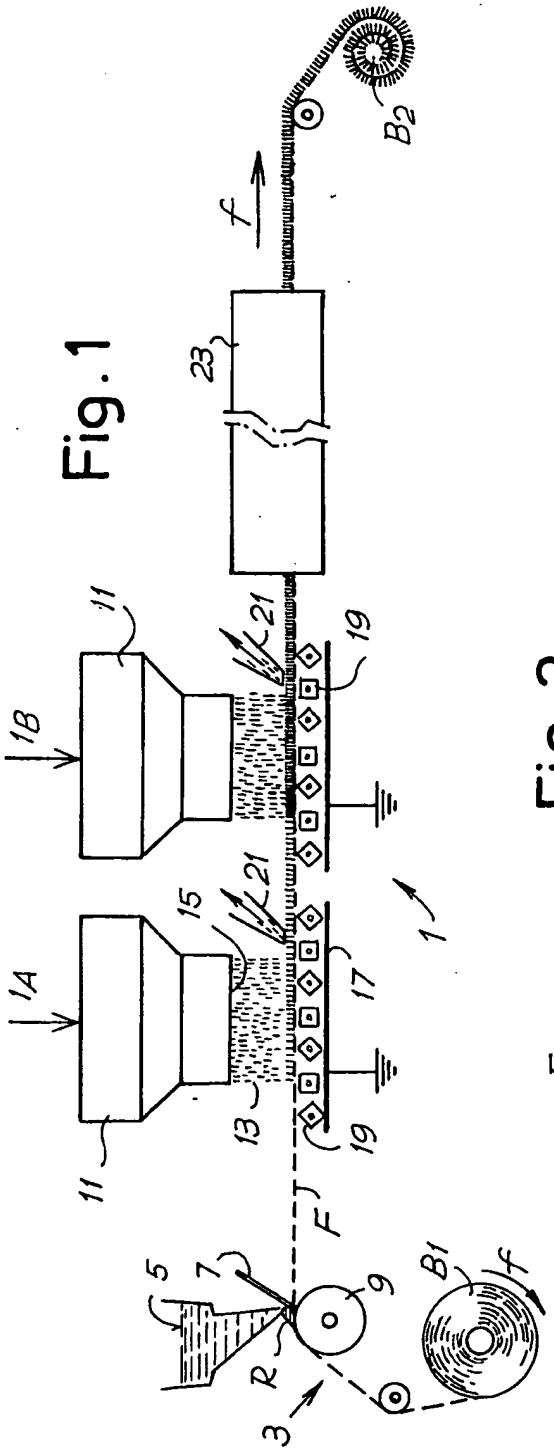


Fig.1A

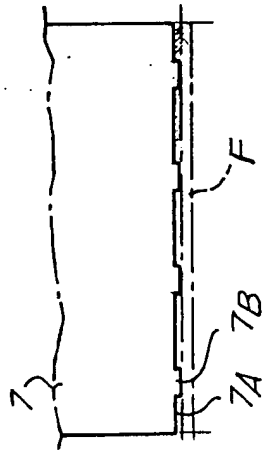


Fig.2

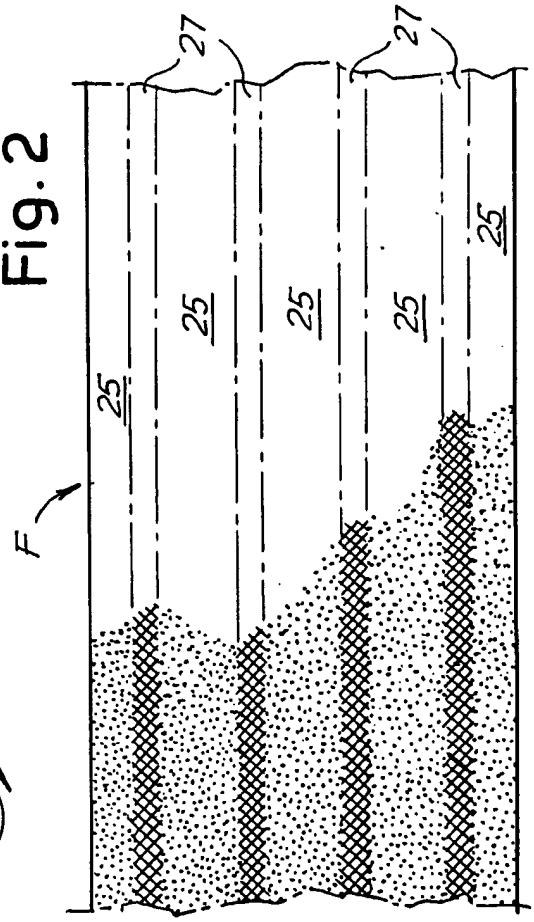
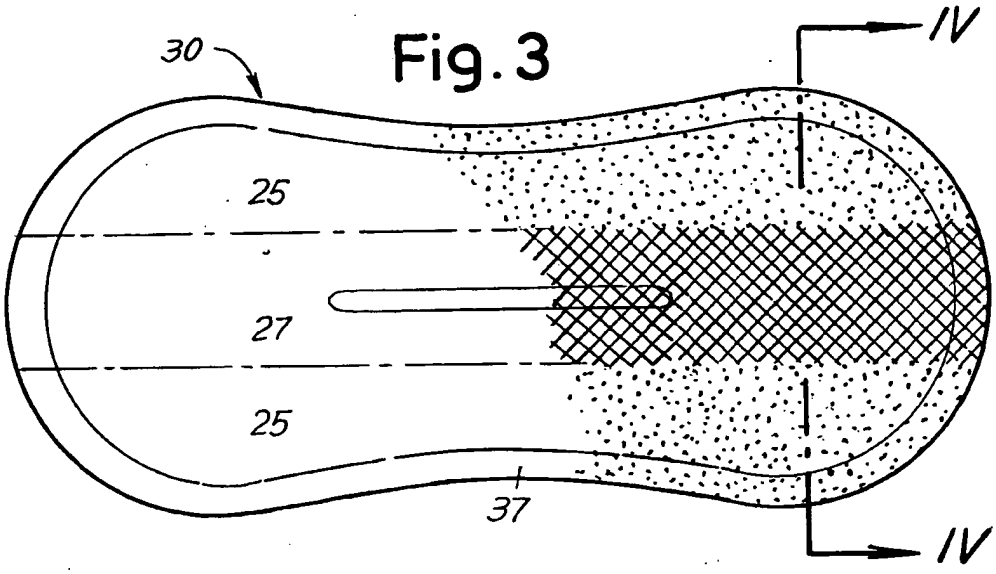


Fig. 3



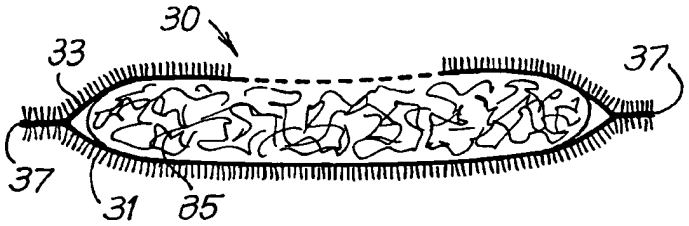


Fig. 4A

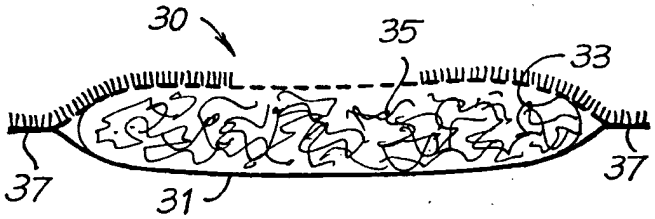


Fig. 4B

Fig. 5

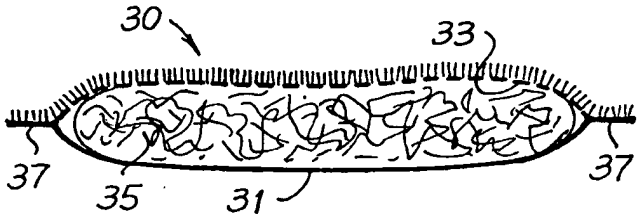


Fig. 6

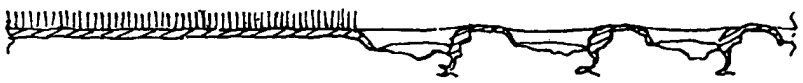
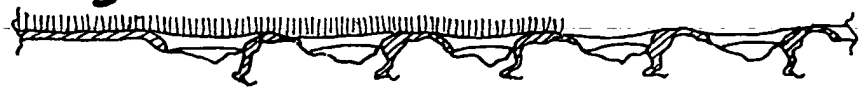


Fig. 7



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 83 0145

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	DATABASE WPI Section Ch, Week 8505 Derwent Publications Ltd., London, GB; Class A96, AN 85-027794 & JP-A-59 222 330 (NITTO ELECTRIC IND KK) , 14 December 1984	1	A61F13/15
Y	* abstract *	6	
A		12,13	

Y	US-A-3 967 623 (BUTTERWORTH)	6	
A	* column 2, line 63 - column 4, line 57; figures *	1-3,10	

A	GB-A-2 171 016 (KAO CORP.)	1,2,4,6, 8,9,11, 13	
	* page 6, line 54 - page 8, line 35; claims 1,3,4; figures 16-18,28,29 *		

A	US-A-5 171 238 (KAJANDER)	1-3,6, 10,13	TECHNICAL FIELDS SEARCHED (Int.Cl.6)
	* column 2, line 65 - column 3, line 63; figures 3,4 *		A61F A61L

A	US-A-3 665 921 (STUMPF) * abstract; figure 3 *	1,6	

A	US-A-3 945 386 (ANCZUROWSKI) * column 2, line 14 - line 28; figures 4,6 *	1,6	

A	FR-A-2 319 434 (HOECHST AG) * page 8, line 8 - line 15; claims 1,13 *	1	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	18 October 1995	Kanal, P

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)